NASA Activities

National
Aeronautics and
Space
Administration

December 1989
Volume 20, No. 10

THIS ISSUE

This month's *NASA Activities* takes a look at the year's accomplishments and finds the picture bright. The accomplishments have been many and have shown a vigor remarkable after the hiatus caused by the Challenger disaster. NASA Administrator Truly recently outlined his assessment of the agency's progress before an audience at the National Press Club. A brief review of his comments are included in this issue. Also presented is a **thumbnail sketch of the year's major events entitled "1989 — On the Road Again: A Retrospective of the Year".**

"NASA Visions" reviews the mission of the Voyager program, "a most excellent adventure", brought to a climax by the Voyager 2 encounter with Neptune, four billion miles from Earth.

"Is anybody out there?" Looking for intelligent life in the universe is yet another way NASA explores space and in this issue the SETI program is reviewed.

Encouragement for education amongst minorities, as well as all of the nation's youth is close to the heart of the space agency and efforts to boost Hispanic employment and education and to encourage reading are highlighted in this issue.

Center Highlights reviews harvest time down at KSC's space-age farm, astronaut selection and a new flight safety development to aid pilots and assure "white knuckle" flyers.

Finally, a hearty thanks to all who make NASA the great positive force it is for our country. *NASA Activities* reviews 1989 awards including NASA's Presidential Rank Executives.

Next Month:

"Back to the Future".

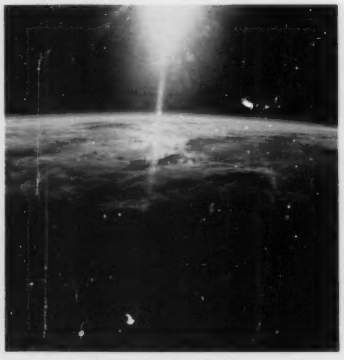
CONTENTS

"Official Comment" Truly's Assessment of NASA Upbeat 3
1989 — On the Road Again: A Retrospective of the Year 4

Agency Highlights
NASA Visions: 1989's Most Excellent Adventure 8
Consolidation of Space Flight/Space Station Offices Detailed 9
LDEF is Coming Home 10
Is Anybody Out There...??? SETI Gears Up 11
Program Boost Hispanic Employment, Outreach, Education 12
Administrator Gives Boost to Reading Program 12

Center Highlights
Harvest Time Down on KSC's Space-Age Farm 13
Astronaut Selection 14
Langley Takeoff Monitor System to Enhance Flight Safety 15

Departments
Q & A: Destiny in the Clouds 16
"Awards" 1989 NASA Honors Given 17
1989 Presidential Rank Executives 19
Human Factors 20



About the Cover

Sunlight streaks over the Earth in this STS-29 view of the terminator. Symbolic of a new morning for the productive new year of 1989, STS-29 deployed a Tracking and Data Relay Satellite to complete the TDRS system network.

NASA Activities is published monthly by the National Aeronautics and Space Administration for the information of the Agency's employees. Contributions and recommendations are solicited from Headquarters and field centers, and should be addressed to Editor, NASA Activities, Internal Communications Branch, Code LPC, NASA Headquarters, Washington, DC 20546.

NASA Activities is distributed free of charge only to agency employees. This publication is available by subscription from the Superintendent of Documents, Washington, DC 20402. Checks or money orders should be made payable to Superintendent of Documents, GPO. Subscription rates are $8.00/year, domestic; $10.00/year, foreign.

L.R. Reinertson
Editor

Joyce Jones
Editor's Assistant

NASA Headquarters
Washington, DC 20546
Phone: (202) 453-8425

Truly's Assessment of NASA Programs Upbeat

Four months after becoming NASA Administrator, Vice Admiral Richard H. Truly issued an upbeat assessment of the agency's many programs and said an analysis of future manned missions to the moon and Mars "is proceeding exceedingly well."

While the Moon and Mars missions "will be technically demanding and not without risk, they are well within our reach," Admiral Truly said at a National Press Club luncheon in Washington, D.C. recently.

"These expeditions will stimulate new technologies and enhance our nation's long-term productivity," Admiral Truly said. "They will improve national competitiveness. They will advance scientific knowledge and lead to discoveries about our solar system, Earth and life, itself."

The NASA leader's broad-brush review of current NASA programs included the following highlights:

• Aeronautics - NASA technology has enabled the U.S. aerospace industry to maintain "an unqualified lead in world markets." To help maintain this position, NASA has revived research on a high-speed civil transport — research that will lead to "environmentally sound, supersonic travel for the future."

• Space Science - The recent launches of the Galileo and Magellan space probes ushers in an extraordinary era of space science missions. Over the next 5 years, NASA will launch 37 space missions that will "radically change our understanding, not only of the universe but also of ourselves."

• "Mission to Planet Earth" - Using "superior new instruments," we can take a comprehensive look at the entire global system — lands, oceans, ice and atmosphere. This program is taking shape and promises to provide data that "will be coordinated in a decades-long effort to better understand our fragile Earth."

• Space Shuttle - With six successful missions since the return to flight, NASA is moving confidently to safely increase the Shuttle's flight rate. The Shuttle is "unquestionably a far safer and much more reliable vehicle" and will be critical in the construction of Space Station Freedom.

• Space Station Freedom - The "cornerstone of our future in space," Freedom is the largest international cooperative space project ever undertaken. It is an essential step toward moving again beyond Earth orbit and into the solar system, providing new insights into the human body and psyche as we cope with longer durations of space flight; allowing us to test exploration technologies; and permitting the assembly service of space vehicles.

Last July 20, the 20th anniversary of the Apollo 11 moon landing, President Bush committed the United States to return to the moon and then explore Mars. NASA is supporting the efforts of the National Space Council, chaired by Vice President Quayle, to determine what resources will be required and to set a realistic timetable to meet these goals. Admiral Truly said the benefits of future missions to the moon and Mars are difficult to quantify and include such intangibles as knowledge, success and pride. "Each time we go to the frontier and beyond," he said, "we bring back more than we hoped for. This time we have the chance to bring back more than we can imagine."

He also said manned space exploration will stimulate science and engineering education in the United States. "I feel strongly that NASA has a special responsibility in education for a very special reason. Our programs — airplanes, spaceships, moon, Mars and astronauts — can get to kids." ■

"Each time we go to the frontier and beyond, we bring back more than we hoped for. This time we have the chance to bring back more than we can imagine."

1989 — On the Road Again!

A Retrospective of NASA Accomplishment

January

Stellar Corpse "Born Again"

The promise of 1989 was signalled by the discovery of evidence of vigorous activity in a white-dwarf star previously thought to be a "stellar corpse", incapable of such lively behavior.

Located about 1,500 light-years from Earth and considered at the end of its life, the enigmatic senior sun exhibited a relatively recent shedding of gas.

Announcement of the stellar phenomenon was made by astronomers from the Space Telescope Science Institute, the University of Arizona, Kitt Peak National Observatory, the Lunar and Planetary Laboratory and the University of Montreal and the research was supported by NASA and the National Science Foundation.

STS-29 Launch Caps TDRS System.

Airborne Arctic Stratospheric Expedition Mounted

Funded and managed by NASA, an international team journeyed to Stavanger, Norway to investigate the chemical composition of the Arctic polar stratosphere and the potential for Arctic ozone depletion in the northern polar region.

The team consisted of researchers from NASA, NOAA, the National Science Foundation's National Center for Atmospheric Research, the United Kingdom Meteorological Office, the U.K. Department of the Environment, the University of Oslo and the Norwegian Meteorological Office. Additional data was provided by West German, Danish and Soviet balloon sounding teams located throughout the Arctic region.

Using a specially instrumented DC-8 and ER-2 atmospheric research aircraft, investigators reported that the Arctic region was primed for the same type of ozone depletion as had been found the previous year in the Antarctic.

February

NASA Engine Research Program Returns $Millions to U.S. Treasury

By late February 1989, a NASA program to save fuel and reduce engine noise on jet transport aircraft, had returned more than$19 million back to the U.S. Treasury since its beginning in the 1970s. Pratt & Whitney, a unit of United Technologies, presented NASA Lewis Research Center a check for over $3 million, for the preceding year's recoupment gained through recovery-of-cost provisions for commercial sales resulting from NASA technology.

STS-29 Launches TDRS to Complete System

The STS-29 mission, crewed by mission commander Michael L. Coats, pilot John E. Blaha, and mission specialists James F. Buchli, James P. Bagian and Robert C. Springer; deployed the 5,000 pound Tracking and Data Relay Satellite which completed the TDRSS space communications and data network. The network became operational June 3, after the satellite attained its final orbital position.

March

Mission Adaptive Wing Completes Program

Flight tests of a wing modified so the curvature of its leading and trailing edges may be varied in flight were completed during a joint NASA/Air Force/Boeing flight research program at NASA Ames-Dryden Flight Research Facility. The system would allow an airplane to fly with optimum wing curvature or camber for subsonic, transonic or supersonic speeds. The program evaluated performance improvements with the variable camber wing mounted on a

ER-2 Supports Arctic Ozone Study.

specially modified F-111 compared to a fixed-camber wing.

April

Fletcher Resigns 2nd Term, Truly Selected Administrator

NASA Administrator James C. Fletcher, brought back for a second term as administrator after the Challenger accident, resigned April 8, with the successful conclusion of the third post-Challenger Space Shuttle mission.

NASA Deputy Administrator Dale D. Meyers served as acting administrator until Rear Admiral Richard H. Truly was nominated as administrator by President George Bush.

Magellan Deployment Marks Beginning of Ambitious Space Science Program

With the first Space Shuttle to launch a planetary mission, NASA also kicked-off a "new golden age of space science." The Magellan space craft, designed to map 70 to 90 percent of the surface of Venus was also the first planetary vehicle to by launched by the Space Shuttle. The STS-30 mission was crewed by mission commander David M. Walker, pilot Ronald J. Grabe, and mission specialists Norman E. Thagard, Mary L. Cleave and Mark C. Lee.

May

Final Propfan Flight Tests Conducted

Tests of a large eight-bladed, single-rotation propfan on the left wing of a specially modified research aircraft show that such advanced jet propulsion systems can reduce fuel usage by 25 to 30 percent compared to future turbofan engines with equivalent levels of advanced technology.

Managed by Lewis Research Center, the program also incorporated technical expertise of Langley and Ames Research centers, including Dryden Flight Research Facility.

President Names Replacement Orbiter

A new Space Shuttle orbiter currently under construction was dubbed "Endeavour" by President Bush. The name "Endeavour" resulted from a nationwide orbiter-naming competition supported by educational projects created by student teams in elementary and secondary schools.

Endeavour was the first ship commanded by James Cook a British explorer, navigator and astronomer of the eighteenth century.

June

U.S./USSR Spacebridge Helps Armenian Earthquake Victims

U.S. and Soviet physicians used a telemedicine spacebridge to provide medical assistance to the victims of the earthquake that devastated parts of the Soviet republic of Armenia in December 1988. NASA initiated the idea immediately after the earthquake to help Armenian physicians with diagnosis and treatment.

The physicians met to discuss difficult medical cases resulting from the earthquake and each case presented was representative of many people suffering the same medical problems. Linked by satellite, the doctors had access to audio, visual and facsimile communications capabilities.

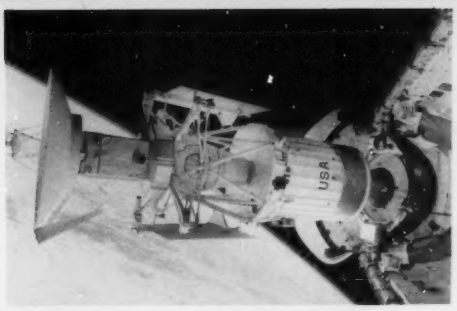
Molecular Structure of Blood Protein Identified

Scientists at Marshall Space Flight Center successfully determined the three-dimensional structure of human serum albumin, the most abundant plasma protein in the human circulatory system.

continued on next page

Space ShuttleTransportation System Gears Up

Earth Atmospheric Studies Reveal Environmental Concerns



Magellan Venus Bound Via STS-30.

Advanced Turboprop Technology Proved.

"Golden-Age" of Solar System Exploration Begins

Aeronautical Technology Proves Payoffs Past, Payoffs Future

The discovery may help in the design of new or improved disease-fighting drugs.

Knowing the molecule's structure may allow pharmaceutical companies to design new drugs or alter existing drugs to allow them to be more efficiently carried by the protein molecule through the body.

July

Milestone Reached in Superconductivity

Scientists at Lewis Research Center have established a new benchmark in the application of high-temperature superconductors to high-frequency electronic circuits. They have produced the first electronic circuit able to operate at 33 to 37 Gigahertz, a frequency range more than three times higher than attainable with previously developed circuits. These frequencies will allow satellites to process data at much faster rates, tripling the number of communications linkups they can handle.

Improved Columbia Returns to Flight.

August

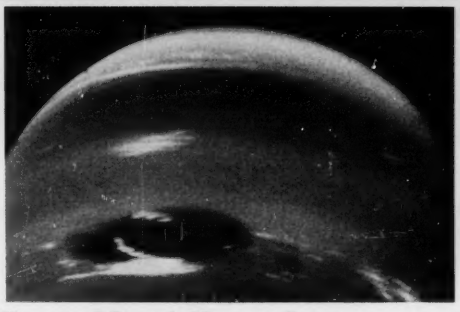
Columbia Returns to Flight for STS-28

An extensively improved Space Shuttle Columbia returned to flight for a DOD dedicated, classified mission. The STS-28 Columbia was crewed by mission commander Brewster H. Shaw, pilot Richard N. Richards, mission specialists James C. Adamson, David C. Leestma and Mark N. Brown.

17 Space Grant Colleges/ Consortia Designated

NASA has selected 17 universities and consortia as Designated Space Grant Colleges/ Consortia in the first element of the agency's new National Space Grant College and Fellowship Program.

Mandated by Congress in 1987, the designated institutions, which are already significantly involved in space-related activities, will receive grants and fellowships. The designated organizations were selected based on a competitive evaluation of the institutions' existing aerospace activities, as well as the quality of their plans to strengthen the national educational base for science, math and technology.



Voyager 2 Reveals Neptune Secrets.

Voyager 2 Encounter With Neptune a Stunning Success

Completing a "grand tour" of the four giant outer planets of the solar system, Jupiter, Saturn, Uranus and Neptune; Voyager 2 skimmed past the big blue planet, discovering moons, rings and atmospheric and geologic phenomena never before known. Functioning far beyond its nominal life and in near darkness, the Voyager spacecraft and its ground team completed an astronomical "grand slam".

Revealed were the planet's 16 hour day, its anti-cyclonic dark spot, its smaller light areas, called "scooters" by scientists; its cirrus clouds circulating high in the atmosphere,700 mph retrograde winds, rings and incomplete rings, as well as one of the solar system's most interesting moons, Triton. Triton's coverage, too, revealed a treasure trove of data including evidence of icy volcanism with plumes jetting five miles into its atmosphere before spreading hundreds of miles across its pinkish methane cluttered surface, the coldest discovered in our solar system. In all, Voyager delivered far more and far better than ever expected.

September

Major Antarctic Ozone Hole Observed

Scientists at Goddard Space Flight Center have observed the development of an ozone hole that may equal the record-setting hole of 1987. The scientists have closely monitored ozone levels over the Southern Hemisphere with the Total Ozone Mapping Spectrometer (TOMS), an instrument on board NASA's NIMBUS-7 satellite.

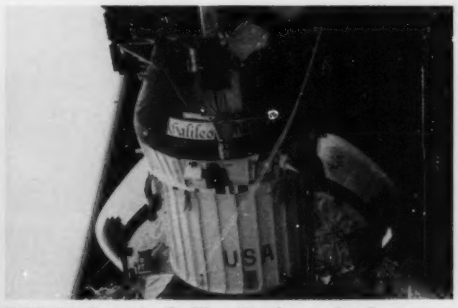
October

Galileo Probe Jupiter Bound

Boosted to low earth orbit by STS-34 Space Shuttle Atlantis, the Galileo space probe of Jupiter was sped on a Venus-Earth-Earth Gravity Assist, or VEEGA trajectory by its inertial upper stage. The trajectory will take the spacecraft around Venus, the sun and Earth and Earth again, before making its way to Jupiter by December 1995.

One portion of Galileo will enter the Jovian atmosphere, deploy a parachute system and descend while transmitting data back to Earth via Galileo's orbiter. While the atmospheric probe is expected to operate for about 75 minutes, the orbiter will continue its primary mission around Jupiter and four of its satellites for 22 months.

Galileo's goals include the study of the chemical composition, state, and dynamics of the Jovian atmosphere and satellites and the investigation of the structure and physical dynamics of the planet's powerful magnetosphere.



STS-34 Speeds Galileo Probe to Jupiter.

November

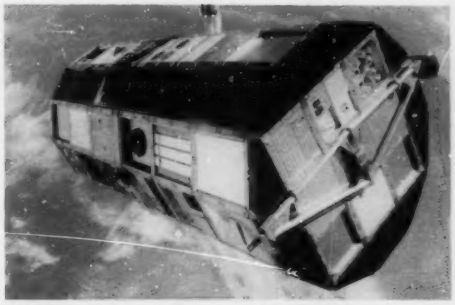
COBE to Look Out Into Space, Back In Time

A spacecraft that will study the origin and dynamics of the universe, including the theory that the universe began about 15 billion years ago with a cataclysmic explosion — the Big Bang, was launched from Vandenberg AFB November 18th, 1989.

Called COBE, for Cosmic Background Explorer, the spacecraft, boosted into a 559 mile high polar orbit will measure the diffuse infrared radiation (cosmic background) that bombards Earth from every direction.

STS-33 Space Shuttle Discovery Mission

STS-33, a Department of Defense dedicated mission was crewed by Mission Commander Frederick Gregory, Pilot John Blaha and Mission Specialists Story Musgrave, Kathy Thornton and Sonny Carter.



LDEF to Come Home on STS-32.

December

Long Duration Exposure Facility Return to Earth

As of this writing, the Greyhound Bus-sized Long Duration Exposure Facility, launched in April 1984, is finally due to be returned to Earth by Space Shuttle Columbia. The STS-32 mission, commanded by Daniel Brandenstein, with James D. Wetherbee as pilot and mission specialists Bonnie J. Dunbar, David Low and Marsha S. Ivins will capture and return the LDEF and its 57 science, technology and applications experiments.

Primary payload for deployment on the mission is the SYNCOM IV-F5 communications satellite. ■

New Leadership Underscores Agency's Return-to-Space Mode

NASA Helps in Disaster Relief, Aids U.S. Education

NASA VISIONS

1989's Most Excellent Adventure

First stop on the Voyager grand tour was giant Jupiter.

Among the major discoveries the Voyagers made at Jupiter were active volcanoes on the satellite Io, thin rings of dust encircling the planet and three new moons orbiting our solar system's largest planet.

At Saturn, Voyager 1 found that the large Saturnian moon Titan has an atmosphere composed primarily of nitrogen containing simple organic compounds that might have evolved into living organisms if Titan was not so cold. Several moons were discovered.

Saturn's rings were found to be dynamic, with thousands of tiny wave-like features caused by the gravitational effects of small moons found in and around the rings. These radial spoke-like features may be electrically charged dust particles levitated above the ring plane.

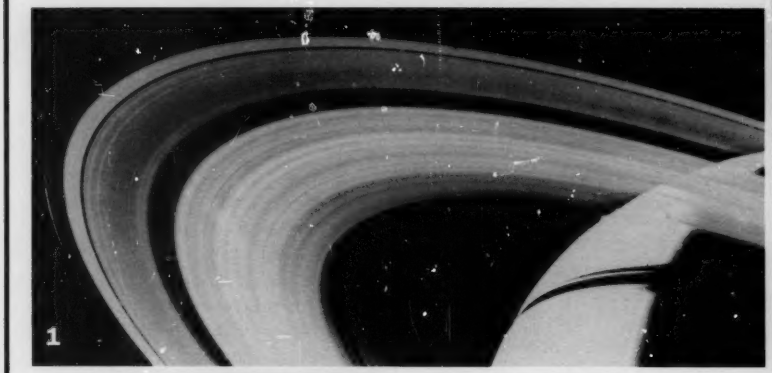
At Uranus, Voyager 2 found a strange magnetic field with a corkscrew-shaped tail extending millions of miles into space.

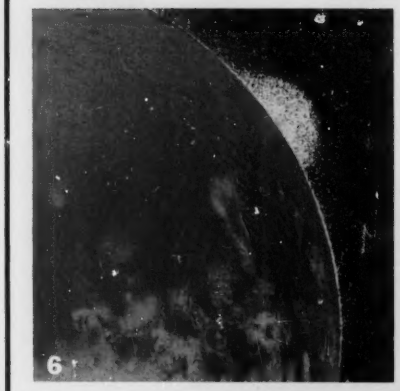
From the information Voyager returned about the magnetic field, Voyager scientists inferred that electrically conductive atmospheric layers must exist deep beneath the bland, visible atmosphere.

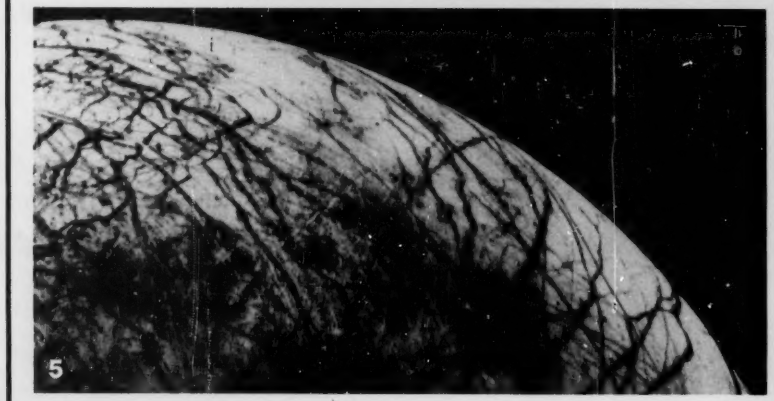
Voyager's close-ups of the Uranian moon, Miranda, showed the small satellite to be dramatically fractured by geophysical forces. Miranda was found to have one of the most geologically diverse landscapes seen in the solar system.

More than 100,000 photos were taken during the Voyager 1 and 2 encounters of Jupiter and Saturn, and another 7,000 images were returned by Voyager 2 during the Uranus encounter. ■

Voyager Grand Tour Provides Grand Discoveries







Consolidation of Space Flight/Space Station Offices Detailed

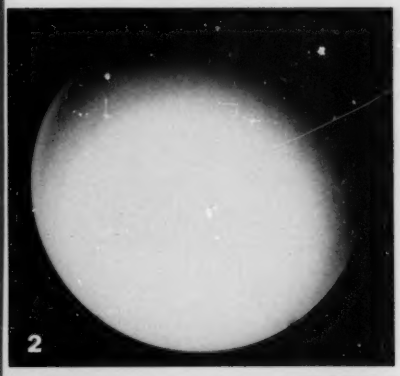
NASA Administrator Richard H. Truly has provided additional details on the consolidation of the Offices of Space Flight and Space Station into a single organization headed by Associate Administrator Dr. William B. Lenoir and called the Office of Space Flight (OSF). George Abbey will continue to serve as the deputy associate administrator for the office.

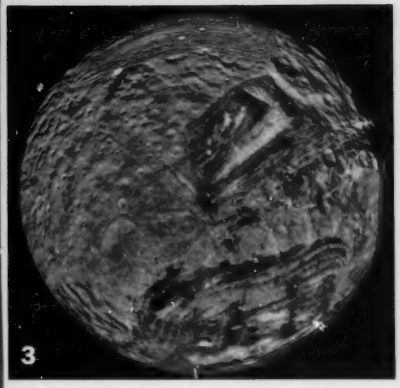
OSF will include four major areas: Space Shuttle, Space Station Freedom, Space Flight Systems and Human Resources and Institutions. Robert L. Crippen is the acting director of the Space Shuttle program, and Richard H. Kohrs is the director of the Space Station Freedom program. Joseph B. Mahon is the director for Flight Systems, and Richard J. Wisniewski is the director for Human Resources and Institutions.

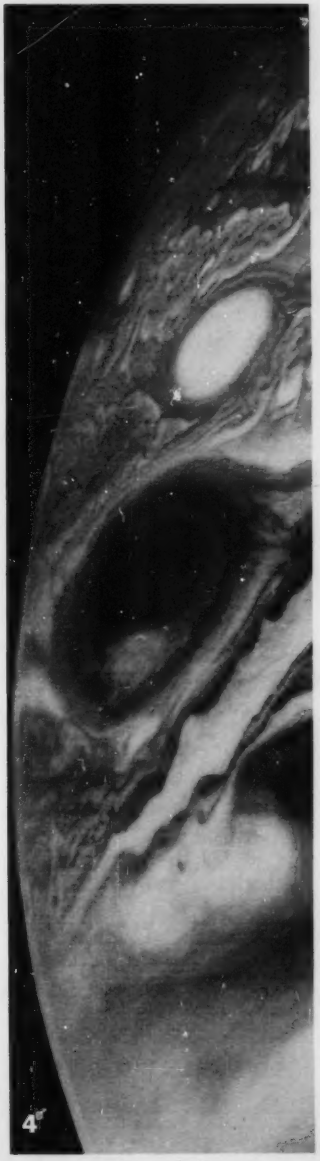
The consolidation results in no major changes in the Space Shuttle program. At NASA Headquarters, the organization now in place continues with the major functions of Program Plans, System Engineering and Analysis, and Operations Utilization. Two deputies, one for program and one for operations continue to be located at the Johnson Space Center (JSC), Houston, and Kennedy Space Center, Fla., respectively. Lines of communication and decision making remain unchanged.

The most significant changes have been made to program management organizational elements within the Space Station Freedom Program. This organization has been strengthened and program management has been consolidated into NASA Headquarters, and Reston, Va.

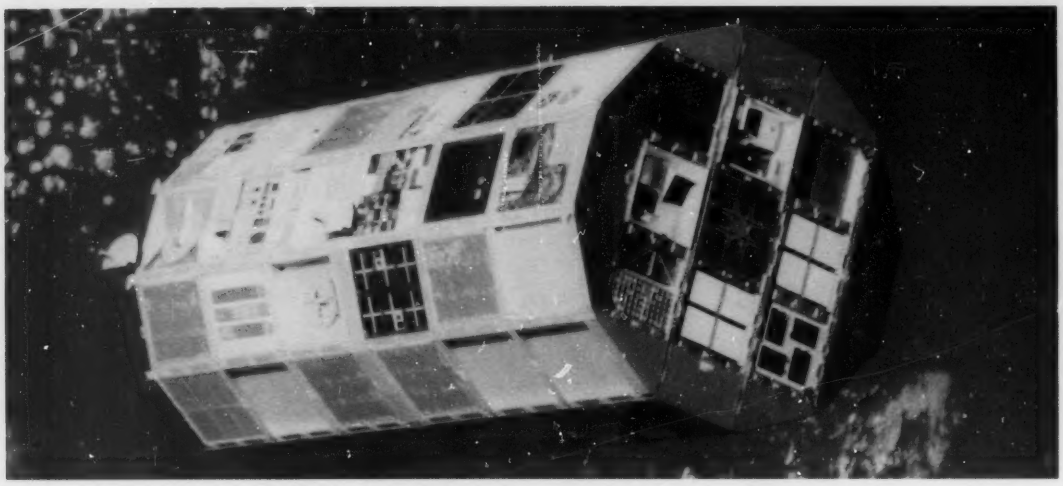
The program director's office will now include three major functions: engineering, operations and policy. The deputy director, Robert Moorehead, is located in Reston. The deputy director is supported by a deputy for operations, also located at Reston, and a deputy for integration, located at JSC. The deputy for integration is supported by two field offices, with a manager for element integration at the Marshall Space Flight Center, Huntsville, Ala., and a manager for system integration at JSC.■







1. Parting glance at Saturn, Nov. 1980, Voyager 1. 2. High altitude haze detected on Uranus, Jan. 1986. 3. Uranus moon Miranda's striking terrain, Voyager 2, Jan. 1986. 4. Jupiter's Great Red Spot, Voyager 2, June 1979. 5. Jovian Europa exhibits fractured crust, Voyager 2, July 1979. 6. Erupting volcano on Jupiter's moon Io, March 1979, Voyager 1. 7. Close up of Neptune's Triton, Aug. 1989, Voyager 2.



LDEF moments after deployment, April 1984.

Racing against time and a decaying orbit brought about by unexpected solar activity, STS-32 Space Shuttle Columbia is scheduled to pluck NASA's Greyhound Bus-sized Long Duration Exposure Facility (LDEF) from the jaws of certain orbital decay during its mission this month.

This free-flying satellite, carrying 57 science, technology and applications experiments sponsored by NASA, the Department of Defense, private industry, universities and foreign governments, was launched on STS-41C and deployed into orbit in April 1984. Cessation of Space Shuttle flights following the Challenger accident, as well as manifesting considerations prevented retrieval of the unique vehicle prior to December 1989.

However, after more than 5 years in space, LDEF is a unique and valuable repository of information on space environmental effects. LDEF also has valuable science and applications data on board. The data will have critical design implications for spacecraft that have requirements for long-duration flight in low-Earth orbit. However, before scientists can study this data, LDEF must be retrieved. Otherwise, the spacecraft and its experiments will be destroyed during reentry.

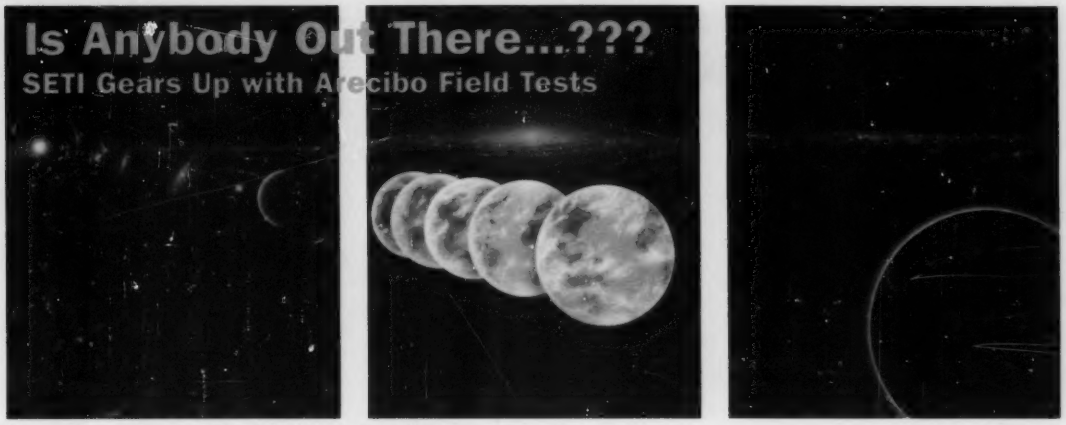
Recognizing the significance of LDEF, NASA has been monitoring the spacecraft's orbital altitude and making every effort to ensure a successful retrieval. Prior to 1988, LDEF was expected to be in orbit until the mid-1990s. This expectation rested on the belief that the 11-year solar flux cycle would be close to normal. A higher rate of solar flux increases the density of the LDEF orbital environment which, in turn, accelerates the LDEF altitude decay rate.

In early 1988 during solar cycle 22, the levels indicated that solar activity during this cycle might approach the maximum of past cycles. On this basis, a mid-to-late 1990 LDEF reentry was predicted. Accordingly, NASA planned a Space Shuttle mission to retrieve LDEF. To protect against the uncertainties in solar activity and potential schedule delays, this mission was inserted in the Shuttle manifest as early as possible, consistent with the minimum lead times required for crew training and other mission planning.

Since prediction of solar flux is not a science, a panel of experts has been advising NASA for the past year. During this period, the predictions have continued to change significantly. In early April 1989, LDEF reentry projections ranged from November 1989 to January 1990 or later, with December 1989 as a "best estimate." However, during the month of May, the flux was significantly less than predicted. The latest reentry estimate is January 1990.

Each month a new forecast is developed for the next 90 days. Every week, NASA updates the reentry predictions with LDEF altitude information obtained from tracking data and the latest solar flux projections.

Should the erratic solar activity cause LDEF to reenter the Earth's atmosphere before it can be retrieved, there is only an extremely remote chance of property damage or personal injury. LDEF's orbit is mainly over water and most of the satellite would break up and burn as it passes through the Earth's atmosphere. ■



A cosmic evolution triptych by Jon Lomberg.

This past summer, scientists and engineers with NASA's Search for Extraterrestrial Intelligence Microwave Observing Project (SETI MOP) conducted field tests of signal detection and processing hardware at the world's largest radio telescope, the Arecibo Observatory, in Puerto Rico. SETI MOP is slated to use the giant antenna, which is operated for the National Science Foundation by the National Astronomy and Ionospheric Center.

SETI will develop systems to be used with existing radio telescopes for detecting signals of extraterrestrial intelligent origin.

The search will be conducted in two ways: A sky survey, for which Ames Research Center is responsible, will sweep the celestial sphere for signals; and a targeted search, for which the Jet Propulsion Laboratory is responsible, will focus on 800 nearby sun-like stars. High sensitivity and high speed processing characterize the system being developed for SETI MOP.

The purpose of the Arecibo work was to test the prototype signal detection equipment, a multichannel spectrum analyzer and a prototype radio spectrum surveillance system to determine its abilities in predicting radio frequency interference (RFI) at Arecibo and to help develop an RFI prediction model. A University of California instrument for "parasitic" SETI searches was also tested.

The summer test revealed that Arecibo is surrounded by a cloud of radio "noise" generated by manmade equipment, that could interfere with SETI signal detection.

The Arecibo Observatory site, Puerto Rico.

More extensive study of the RFI environment at Arecibo will be necessary in different frequency ranges. Each antenna site may require customized modeling and signal detection to limit RFI effects.

Upgraded systems for each survey will be deployed for three months next year. These will be upgraded again and put into operation for start of the SETI project in 1992.

Dr. Jill Tarter Appointed

Participating in the Arecibo field tests was Dr. Jill Tarter, a 12-year veteran of the SETI program. Tarter was appointed SETI project scientist at Ames earlier this year. She is currently principal investigator for the non-profit SETI Institute, Mountain View, Calif. and an Associate Research Astronomer at the University of California, Berkeley. Tarter chairs the SETI Science Working group.

The SETI Microwave Observing project has strong reasons for searching the universe for signs of life. Modern astrophysical theories indicate that planets may be the rule rather than the exception around the stars in our galaxy. Biological theories predict that, given enough stability on a planet, life, intelligence and technology may evolve. The Earth is an example that this sequence has occurred at least once.

Current theory holds that planetary systems around solar type stars are potential "life sites." Within our Milky Way galaxy alone, it is estimated that there may be three million good potential life sites. ■

Program Boosts Hispanic Employment, Outreach, Education

By Orlando A. Gutierrez, Hq

Thanks to a healthy and active NASA employment program, more Hispanics than ever are joining the agency's scientific and engineering work force.

NASA's effort, the Hispanic Employment program (HEP), is multifaceted. It includes recruitment, community outreach, internal agency education and encouragement, as well as promoting scientific and engineering educational activities to the Hispanic student.

The results of the efforts made by HEP managers are seen in the increase of Hispanics in NASA's scientific and engineering fields. Comprising only 0.9 percent of the agency's work force in 1974, Hispanics now are 3.3 percent (1989) of its scientific and engineering team. They also represent six percent of the NASA Co-op program for college students.

Recruitment efforts include yearly visits to the University of Puerto Rico, the University of New Mexico, New Mexico State University, the University of Texas, El Paso; the University of Miami and City College of New York. Many of these institutions have cooperative education agreements with NASA centers.

Recently lauded were HEP managers (l to r) Chris Rodriguez, GSFC; Lupita Armendariz, JSC; O.A. Gutierrez, Hq; Diana Centeno-Gomez, LeRC and Oscar Gamboa, KSC.

One of NASA's high-ranking Hispanic women in the science and engineering field, micobiologist Dr. Nitza Cintron conducts research at JSC.

The search for Hispanic talent also extends to career fairs from such organizations as the Society of Hispanic Professional Engineers and the Mexican American Engineering Society.

A continuing interaction with Hispanic community organizations, from business and national associations to local church groups, is maintained to increase the awareness of NASA, its opportunities and missions, within the Hispanic communities.

Studies point out the need to increase the interest and capabilities of all U.S. students in scientific and engineering careers, especially among women, blacks and Hispanics, which are expected to constitute 85 percent of all new entries into the work force between now and the year 2000. Accordingly, NASA has in place programs designed to increase these interests among Hispanic junior high school, senior high school and college freshmen in Maryland, New Mexico and the Southwest states. ■

Administrator Gives Boost to Reading Program

NASA Administrator Richard H. Truly took his launch skills to an elementary school recently and personally helped a new reading program get off the ground. It was a successful mission.

Meeting with about 340 students at the Rock Creek Forest Elementary School, Montgomery County, Md., Admiral Truly helped initiate the "Launch into a Good Book" program, which is designed to encourage reading among elementary school children. The program features audio cassettes with prominent people reading book passages. The students can read along and practice their skills.

Admiral Truly presented the students with an audio tape on which he read a passage from "Album of Spaceflight" by Tom McGowen. He also spoke briefly with them about the importance of reading and how it is an essential skill for achieving their goals, including those who aspire to space travel.

Rock Creek Forest Elementary School third-grader Leslie Vuniga reads about spaceflight with space veteran Truly.

The NASA Administrator also participated in the President's recent education summit with the nation's governors in Charlottesville, Va. ■

Harvest Time Down on KSC's Space-Age Farm

By Patricia Phillips, KSC

The evolution of space-faring vegetable farms marked another milestone late this summer as Kennedy Space Center scientists harvested the third crop of dwarf wheat grown without soil in a computer-controlled biomass chamber.

"We believe this harvest looks even better than the last one," said Dr. Bill Knott, chief scientist for the Controlled Ecological Life Support System (CELSS) project. CELSS is a unique experiment in which scientists are learning how astronauts and space colonists can grow food in space and revitalize their environment.

The recent harvest is the third crop of dwarf wheat grown in a biomass chamber, a two-story bubble-shaped biosphere converted from test hardware used in the Mercury and Gemini programs.

Using a specially developed environment controlled by computers, the scientists and technicians are learning how to deliver nutrients, monitor growth and gaseous outputs, and produce healthy plants with a minimum of human intervention. "With each crop, we have been able to decrease the amount of human interaction and rely more on the system," explained Dr. John Sager, a NASA agricultural engineer.

The first "sealed chamber" crop was planted in November, 1988. Harvested in January, 1989, that dwarf wheat crop was followed with another wheat crop in April, 1989.

Since spacefarers will have little room, no soil, inadequate sunlight and limited energy to grow food, the CELSS experimenters are carefully analyzing the interaction of plants, nutrients, computer controls, lighting, nutrient delivery systems, and even how humans affect the system. "The system now is so sensitive that it adjusts to human output of carbon dioxide," Sager said. He explained that during this crop the computer-controlled biosphere reacted to light and dark cycles as well as to technicians entering to take standard readings.

Interestingly, in the latter case, the system "adjusted" for the increased carbon dioxide in the air from the technicians' breathing, Sager explained. Such data will be important not only in learning how to control plant growth, but also in achieving another goal: using plants to "scrub the air" by removing carbon dioxide and generating oxygen.

Wheat is one of several crops CELSS researchers will experiment with as the project proceeds. The next crop will be soybeans, with potatoes next on the list. The scientists have been preparing for other crops for months by investigating nutrient delivery systems, analyzing the peculiar responses and needs of different plants, and planning how each can best thrive in the chamber.

Still ahead lies the answer to an intriguing question—can several types of plants be grown in one chamber? Or, based on different needs in nutrients, light, and carbon dioxide sensitivity, will a space-age farm require separate growing chambers for separate plants? "This is a challenging question—and one that is extremely important as we prepare to respond to President Bush's initiative to prepare for not only Space Station living, but also to build lunar bases and go on to Mars," declared Dr. Paul Buchanan, director of KSC's NASA Biomedical Operations and Research Office. ■

Horticultural technician Lisa Siegrist, (left) and scientist Tom Dreschel, both of Bionetic Corp., prepare to remove a tray of dwarf wheat grown in the CELSS biomas chamber. The harvest was the third computer controlled wheat crop produced in the chamber.

Astronaut Selection

How do we pick future space travelers?

By Jeff Carr, JSC

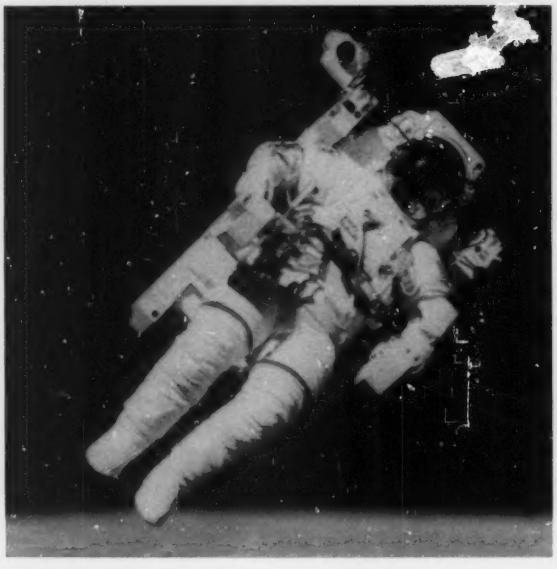
Finding a needle in a haystack might be a simpler proposition than the task that faced a team of NASA "talent scouts" scouring the reams of standard forms 171 that flooded certain file drawers at JSC this summer. These applications for federal employment all bear a common trademark. At the top of the form, in box number "1" (What kind of job are you applying for?) the entries are the same— "Astronaut."

Screening of applications for the astronaut class of 1990 was under way in the first of what will become regular biannual selections. According to statistics compiled by the Astronaut Selection Office at JSC, nearly 2,500 applications were received prior to the June 30 deadline. The two-year hiring cycle was adopted last year in order to assure NASA's ability to meet flight crew requirements while minimizing the impact on center resources, according to Donald Puddy, director of Flight Crew Operations. Those who are needed to serve on the Astronaut Selection Board represent key manpower at JSC.

The selection board is chaired by Puddy, and its members include the director of Life Sciences, Carolyn Huntoon; the chief of Equal Opportunity Programs, Joseph Atkinson; chief of the Astronaut Selection Office, Duane Ross; and a number of senior representatives of the Astronaut Office.

Preliminary screening was done by the Astronaut Selection Office with 1,945 applicants meeting the minimum qualifications for pilots or mission specialists.

The second screening phase consisted of a more detailed review of applications by a JSC rating panel to determine which applicants are most exceptionally qualified, based on such factors as performance, acquired responsibility and applicability of training.



Highly qualified applicants were then turned over to the Astronaut Selection Board for a painstaking assessment of their academic and professional experience and references, plus a review by JSC flight surgeons of applicants' medical forms. The overall rating effort is expected to produced about 100 top candidates.

Beginning last month, the top-rated applicants were invited to JSC in groups of about 20 for interviews and medical evaluations. In this final phase of screening leading to the selection, applicants were evaluated for such qualities as adaptability, communication skills and teamwork.

In addition to being sized up by NASA flight surgeons and members of the selection board, applicants have a chance to learn something more about the jobs they are seeking through orientation briefings and tours. "We really want to pick people who know what they're signing up for," says Steve Hawley, deputy chief of the Astronaut Office and a member of the selection board. "We encourage them while they're here to meet and talk with as many current astronauts as they can."

"We get a little bit smarter about the way we do this with each selection," says Duane Ross, who expects this year's selection task to be comparable to 1987. Statistical comparisons are very close. Of 2,062, 15 finally were selected as astronaut candidates.

Current plans are to announce the class of 1990 in January, with the new hires reporting here in July. Like their predecessors, they will be subject to one year of candidate training and evaluation before receiving technical assignments and full astronaut status.

Ross expects this year's effort to produce anywhere from 12 to18 new top-notch JSC employees. ■

Langley Takeoff Monitor System Designed to Enhance Flight Safety

By H. Keith Henry, LaRC

Langley Research Center is working with the aviation industry to give pilots a simple, yet powerful, new tool to increase safety during the critical takeoff period.

The invention, called the Takeoff Performance Monitoring System (TOPMS), was presented to industry and government representatives in a workshop held recently at Langley. TOPMS is designed to help pilots make the "go/abort" takeoff decision by summarizing valuable safety-related information in a single, easily-understood display.

Statistics compiled over the years indicate that most aircraft takeoff accidents are attributable to some deficiency in aircraft performance. Current cockpit systems, however, do not provide a comprehensive "go-no go" decision aid during the takeoff roll.

TOPMS provides continual "real-time" information updates during acceleration down the runway, presenting the aircraft's progress relative to a normal takeoff for that aircraft and existing flight conditions (such as aircraft loading, weather and wet or dry pavement). The system indicates graphically how far the aircraft is down the runway, the points at which liftoff and other events should occur, whether the engines are working properly and if acceleration is adequate. The pilot can fine-tune his takeoff based on the summary of information generated by the airplane's flight computer and presented on a TV-like electronic screen.

If performance falls critically short of normal, however, TOPMS advises the pilot to abort the takeoff by means of a red "situation advisory flag" shaped like a stop sign, wich appears at the end of the runway graphic. For example, if an engine fails, the appropriate engine indicator turns red and the runway graphic shows the pilot where he can bring the airplane to a complete stop if he elects to abort. When the pilot begins an abort, the overall display drops takeoff information and adds predicted stop points on the runway.

Before and during takeoff, TOPMS temporarily replaces the flight deck navigation display. Immediately following main wheel liftoff, the TOPMS display disappears and the normal map and navigation information return.

Researchers have made more that 1,000 simulated takeoff runs with TOPMS in a transport type ground simulator at Langley, where the sytem's math logic was exercised and display graphics were developed and tested. In addition, more that 50 actual takeoff or aborted takeoff runs have been conducted in a NASA jet transport, confirming that TOPMS can operate in realistic flight conditions, that it is compatible with aircraft sensors and systems and that it can be isolated from normal aircraft vibration. Flight test conditions have included excess drag, reduced thrust and simulated engine failure at various speeds.

ABORT!!! ... TOPMS system advises co-inventor David B. Middleton to abort his simulated takeoff roll.

In the future, the research team will look at the application of TOPMS technology to landing and rollout. The system will be modified to indicate predicted touchdown and stopping points on the runway — or advise the pilot to go around and try again.

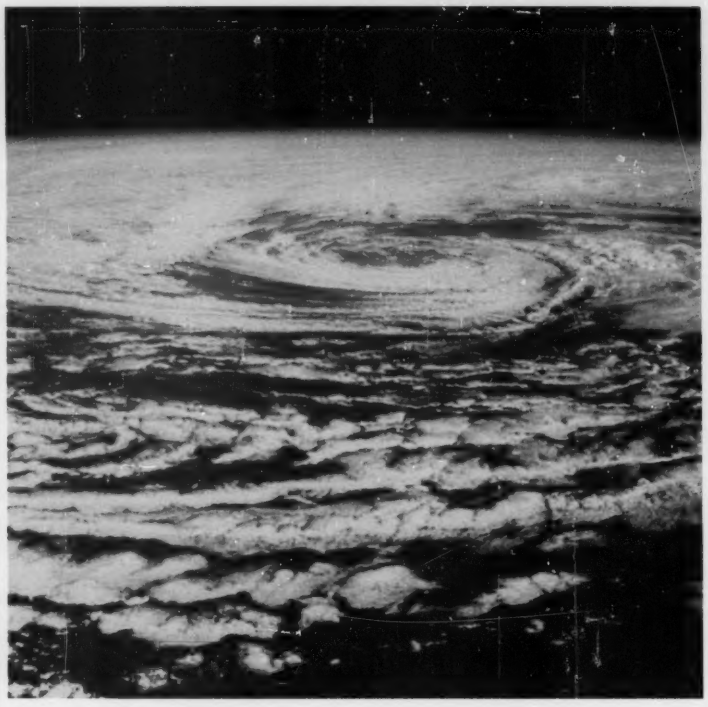
TOPMS was formulated and analyzed at Langley as a part of a cooperative agreemenet with the University of Kansas. The system is a former winner of R&D Magazine's "100 best inventions of the year" competition. The inventors of TOPMS, Langley aerospace engineers David B. Middleton, Dr. Raghavachari Srivatsan and senior NASA research pilot Lee H. Person, Jr., were granted a patent earlier this year. A second patent covering a combined heads-up and heads-down display system is pending. ■

Q&A

The foliowing questions and answers are excerpted from interviews conducted for NASA's radio program, "The Space Story".

Destiny in the Clouds

While nineteenth century poet Percy Bysshe Shelley called clouds "daughters of the Earth and water — nurslings of the sky", NASA Langley researchers have less poetic ways of referring to them and they are concerned not with their obvious functions but with the role clouds play in determining the Earth's global climate, whether they warm the surface like a blanket or reflect heat away like a shield.



Q How large a part do clouds play in Earth's overall weather system?

A Dr. Bruce Barkstrom, Earth Radiation Budget Experiment (ERBE)science team leader at NASA's Langley Research Center says, "I think in terms of climate, clouds are the single largest variable and we're finally getting to the point of realizing that we might be able to understand them well enough so that we can remove a lot of the uncertainty. ...What we've seen on ERBE right now is two effects of clouds: the increased reflection as opposed to the trapping of radiation, keeping it from getting back to space. The reflection effect prevails, so that could serve as a cooling effect on the current climate." The ERBE data indicate that the Earth is cooler by about 20 degrees fahrenheit because of clouds and their influence.

Q How does the influence of clouds compare to other effects such as the century-iong effect of increasing manmade carbon dioxide in the atmosphere and its possible greenhouse effect?

A Barkstrom believes that their influence is about four times as great as that caused by increasing carbon dioxide and that "as the surface temperature goes up, water will tend to evaporate into the atmosphere, so that will increase the amount of water". The area covered by clouds would likely change along with their altitudes and the moisture they carry and each change could affect the climate. "The relevant question over the greenhouse cases is, what are the clouds going to do in response to the changes that the greenhouse effects cause? That turns out, I think, to be the largest single source of uncertainty in making a prediction of the final effect of the greenhouse changes.

Q Knowing how clouds influence the climate may be needed for computer models to predict our planet's future. The data gathered by ERBE satellites is immense, how close are we to coming to a workable understanding of cloud effects?

A Barkstrom points out that years of analysis will be needed before an indepth understanding of the Earth's climate can be developed. He says, "We don't really have a long enough record with the four or five years of data that we've begun to collect to be able to ask sensible questions of the data. ...Clouds are interesting because they're variable. They're a bit larger scale than we usually live at. They're hard to measure. ...But we're living in the middle of a revolution in understanding what clouds are doing. ■

AWARDS

1989 NASA Honors Given

Truly Cites Employee Leadership in Maintaining U.S. Technological and Scientific Prominence

The National Aeronautics and Space Administration has recognized the efforts and excellence of its employees and others at recent ceremonies in Washington, D.C.

In thanking 1989 awardees, NASA Administrator Richard H. Truly said, "This past year has been an extremely successful one for NASA, and I am pleased to express my personal appreciation to those who have worked so hard to bring us to this point. This year's honorees have led the way to ensure that we maintain America's position as a technological and scientific leader in space and aeronautics."

The following awards were given:

Public Service Group Achievement Award

Airborne Antarctic Ozone Experiment Team, HQ; Intertial Upper Stage/Airborne Support Equipment/Spreader Beam Redesign Team, MSFC; National Scientific Balloon Facility Personnel, GSFC; Orbiter Modification & Refurbishment Facility Construction Team - W&J Construction Company, KSC; Orbiter Processing Facility Annex Addition Design Build Contractor Speciality Maintenance and Construction, Inc., KSC; Scout Project Team - LTV Missiles and Electronic Group, Missiles Division, LRC; Sixty-Four-Meter to Seventy-Meter Antenna Extension Project Team - Costruzioni Speciali Alluminio and Eikontech, LTD., JPL; Space Telescope MicroVIP Development Team, GSFC; Supernova Science Team, HQ; Sverdrup Science and Calibration Laboratories - Technical Support Contractor, Sverdrup Technology, Inc., SSC.

Group Achievement Award

Accident Investigation Team, JSC; Advanced Aircraft Technology Aerodynamic Design Team, LaRC; Advanced Life Support Working Group, ARC; Advanced Turboprop Project Team, LeRC; Aerospace Resistor Failure Investigation Team, JPL; Airborne Antarctic Ozone Experiment Team, ARC; Astronaut Science Support Group, JSC; B-1B Engine Nozzle Sonic Fatigue Team, LaRC; Balloon-Borne Laser In-Situ Sensor Team, JPL; Computational Aeroelasticity Program - Transonic Small Disturbance Development Team, LaRC; COSMOS 1887 Project Team, ARC; Crew Station Research & Development Facility Project Team, ARC; Extravehicular Activity Retriever Development Team, JSC; F-106B Vortex Flap Design & Fabrication Team, LaRC; Far Infrared Spectrometer Team, GSFC; GAMMA Ray Observatory Dynamics Simulator Ada Experiment Team, GSFC; Heat Pipe Advanced Radiator Element Payload Data Preprocessor Design & Fabrication Team, KSC; High Angle of Attack Research Vehicle Flight Test Project Team, ARC; High-Speed Transition/Quiet Tunnel Team, LaRC; Integrated Assembly and Configuration Panel, HQ; Joint Exercise Support System Development Teams, JPL; KSC Payload Design Requirements Review Team, KSC; Magellan Spacecraft Assembly & Encapsulation Facility, Facility Activation Team, KSC; Mark III Hypercube & Applications Project Teams, JPL; Mission Operations Directorate/Mission Support Directorate Resource Access Control Facility Team, JSC; MK.III 8.3 PSI Space Suit Development & Evaluation Team, JSC; Mobile Transporter Space Station Truss Assembly Team, LaRC; NASA Airborne Antarctic Ozone Experiment Team, HQ; NASA Space & Earth Sciences Computing Center's Upgrade Support Team, GSFC; NASA Space Station International Agreements Negotiating Team, HQ; NASA's Highly Integrated Digital Electronic Control Advanced Digital Engine Control System Flight Research Team, ARC; National Full-Scale Aerodynamic Complex Project, ARC; Orbital Debris Team, JSC; Orbiter Modification & Refurbishment Facility Implementation and Activation Team, KSC; Oribter Processing Facility Annex Addition Design and Construction Team, KSC; Ozone Trends Panel, GSFC; Payload Hazardous Servicing Facility Activation Team, KSC; Payload Support System Ground Support Development Team, JSC; Real-time Inflight Analysis Techniques Development Team, ARC; San Marco D/L Project Team, GSFC; Scout Project Team, LaRC; Second Shuttle Carrier Aircraft Procurement Committee, JSC; Shuttle Simulation Team, GSFC; Shuttle Training Aircraft Training Team, JSC; Sixty-Four-Meter to Seventy-Meter Antenna Extension Project Team, JPL; Space Biomedical Research Institute Flight Projects Office, Detailed Supplementary Objectives Group, JSC; Space Flight Operations Center Development Team, JPL; Space Physics Analysis Network Management Team, GSFC; Space Station Systems Engineering Analysis Team, LaRC; Space Tranportation Automated Recognition/Measurement and Stimuli II User Acceptance Test, JSC; Supernova Program Planning and Implementation Team, HQ; Supernova 1987a Sounding Rocket Campaign

continued on next page

Representing the Airborne Antarctic Ozone Experiment Team, James J. Margitan, (right) receives NASA's Public Service Group Achievement Award, from NASA Administrator Richard H. Truly.

Support Team, GSFC; Systems Autonomy Intercenter Working Group, ARC; Task Group 1A for General Management Policy, HQ; Thermal Protection System Facility Implementation Team, KSC; Transonic Navier-Stokes Project Team, ARC; Transportation Services Office, Office of Space Flight, HQ; Wind Tunnel Revitilization Task Team, HQ; Workstation Applications Group, ARC.

Public Service Medal

Peter Anderson, GSFC; Joseph J. Attinello, MSFC; Pamela M. Bacon, HQ; Allan Bailey, JPL; Lorin E. Blewett, MSFC; W. Warner Burke, HQ; Alan L. Hallden, MSFC; Joseph J. Miller, GSFC; Michael J. Povec, MSFC; Thomas Reid, HQ; Frederick C. Robbins, HQ; Robert G. Voigt, LaRC.

Exceptional Service Medal

John W. Adolphsen, GSFC; Donald C. Bacon, Jr., ARC; H. Lee Beach, Jr., LaRC; Dennis E. Beebe, MSFC; Larry E. Bell, JSC; Eugene H. Berry, MSFC; David J. Bohlin, HQ; Roland L. Bowles, LaRC; Richard M. Boykin, Jr., LaRC; Joseph H. Bredekamp, GSFC; Albert G. Brejcha, JPL; David F. Bruce, JSC; Bobby G. Bruckner, KSC; Frank Bryan, KSC Robert D. Cabana, JSC; Cyrus C. Casells, Jr., ARC; Richard E. Coblentz, JSC; Kenneth N. Cole, LaRC; Bill D. Colvin, HQ; Harold R. Compton, MSFC; Estelle Condon, ARC; David M. Cooper, ARC; D. Bryant Cramer, HQ; Charles G. Crane, Jr., MSFC; Dallas G. Denery, ARC; Carroll C. Dicus, Jr., HQ; Michael M. Ebersole, JPL; June W. Edwards, HQ; Michael D. Falarski, ARC; Stephen J. Feaster, JSC; Edward A. Frankle, HQ; Donald O. Frazier, MSFC; Delma C. Freeman, Jr., LaRC; Joseph Fries, JSC; Joe T. Galey, MSFC; Glenn W. Garrison, JPL; Shirley M. Green, HQ; Orlando A. Gutierrez, HQ; Evelyn D. Harris, LaRC; Clifford J. Heindl, JPL; Hubert R. Henry, JPL; John W. Holland, Jr., JSC; William J. Huffstetler, Jr., JSC; Garth Hull, ARC; Murzban D. Jhabvala, GSFC; James W. Johnson, KSC; Lee W. Jones, MSFC; James L. Joyner, KSC; William R. Kivett, LaRC; Frank L. Kouba, ARC; Charles G. Krpec, JSC; Arthur J. Mackey, Jr., KSC; Lawrence E. Macioce, LeRC; Howard L. McCallon, JPL; James W. McCulla, HQ; Jerry E. McCullough, JSC; Harry L. McDaris, MSFC; Francis E. McGarry, GSFC; Elric N. McHenry, JSC; Ann R. McNair, MSFC; David H. Mobley, MSFC; Francis J. Montegani, LeRC; Paul M. Munafo, MSFC; Frank Nichols, ARC; William C. Nieberding, LeRC; Stephen J. Paddack, GSFC; William J. Patterson, MSFC; Charles F. Pinson, MSFC; Harry Press, JPL; James T. Ralstson, MSFC; William L. Ray, MSFC; Thomas W. Redmond, JSC; Frederick A. Reeves, MSFC; Lonnie Reid, LeRC; Robert G. Rohal, LeRC; Roger R. Schulte, LeRC; Carl B. Shelley, JSC; Alex Shumka, JPL; William C. Snoddy, MSFC; Ronald

David W. Thompson, Hq, receives NASA's Equal Employment Opportunity Award during ceremonies in Washington. Flanking Thompson are Administrator Truly (left) and Deputy Administrator J.R. Thompson.

J. Sovie, LeRC; Luther T. Spears, Jr., MSFC; Steven R. Speech, HQ; Carlos L. Springfield, KSC; Carl A. Stearns, LeRC; William C. Strack, LeRC; Darryll Stroud, ARC; Jeffrey E. Sutton, HQ; Joseph B. Talbot, LaRC; Kenneth R. Taylor, MSFC; Edna F. Templeton, HQ; Earl W. Thompson, JSC; Samuel L. Venneri, HQ; Lawrence F. Watson, GSFC; Vernon J. Weyers, LeRC; Robert L. White, JPL; Thomas T. Wilheit, Jr., GSFC; David Williamson, Jr., HQ; Maywood L. Wilson, LaRC; Robert J. Wojtal, HQ; Earl G. Woods, SSC; Robert G. Zagrodzky, MSFC; Elliott Zimmerman, KSC.

Equal Employment Opportunity Medal

Angel C. Corral, JPL; Gregory W. Hayes, JSC; James L. Jennings, KSC; David W. Thompson, HQ; Rosa C. Webster, LaRC.

Exceptional Engineering Achievement Medal

John C. Adamcyzk, LeRC; Gary C. Bailey, JPL; Charles H. Ehrmann, GSFC; Bruce D. Fisher, LaRC; John F. Groeneweg, LeRC; James D McAleese, LeRC; Lawrence E. Olson, ARC; Felix L. Pitts, LaRC; Leo D. Staton, LaRC; James L. Thomas, LaRC; Dennis P. Townsend, LeRC; Ann F. Whitaker, MSFC; Allan R. Wieting, LaRC.

Exceptional Scientific Achievement Medal

Robert F. Adler, GSFC; Bruce R. Barkstrom, LaRC; Robert D. Cess, LaRC; Inez Y. Fung, GSFC; Daniel Y. Gezari, GSFC; Richard N. Green, LaRC; Edwin F. Harrison, LaRC; Sandra G. Hart, ARC; Alan E. Hedin, GSFC; Frederick B. House, LaRC; Casimir J. Jachimowski, LaRC; William J. Kaiser, JPL; Donald J. Kessler, JSC; Mario J. Molina, JPL; Douglas B. Nash, JPL; Chul Park, ARC; Thomas H. Pulliam, ARC; Veerabhadran Ramanathan, LaRC; John M. Seiner, LaRC; G. Louis Smith, LaRC; O. Brian Toon, ARC.

Outstanding Leadership Medal

Leslie F. Adams, MSFC; Frank Allario, LaRC; Robert O. Aller, HQ; James W. Cherbonneaux, ARC; Robert J. Coates, GSFC; Charles L. Dunfee, GSFC; Stuart J. Evans, HQ; Eugene Ferrick Jr., HQ; Lennard A. Fisk, HQ; Raymond L. Heacock, JPL; Carolyn L. Huntoon, JSC; John D. Mangus, GSFC; Billie J. McGarvey, HQ; Lewis D. Rinker, OIG ; Leonel S. Stollar, ARC; Chester A. Vaughan, JSC; Lowell K. Zoller, MSFC.

Distinguished Public Service Medal

Oleg G. Gazenko, Inst. of Biomedical Problems, USSR; Robert G. Minor, Rockwell International; Robert B. Ormsby, HQ; Frederick L. Scarf, University of California.

Distinguished Service Medal

William F. Ballhaus, Jr., HQ; James M. Beggs, HQ; James B. Odom, HQ; Robert T. Watson, HQ. ■

1989 PRESIDENTIAL RANK AWARDEES

The 33 individuals listed below have been selected by President Bush as 1989 Presidential Rank awardees. This honor is bestowed on a small number of career SES members whose career achievements are exceptional. Each year only 1% of the Federal Government SES executives may receive the rank of "Distinguished Executive," with a $20,000 stipend, and 5% may receive the rank of "Meritorious Executive," with a $10,000 stipend.

NASA's 1989 honorees include 4 Distinguished and 29 Meritorious Executives. The awardees were honored by President Bush at Constitution Hall on September 14. On Wednesday, October 4, NASA honored the recipients at a dinner held at the Goddard Space Flight Center.

Distinguished Awardees

Thomas Campbell, Comptroller, HQS

Dale R. Compton, Deputy Director, ARC

Richard H.Petersen, Director, LARC

Kenneth S.Pedersen, Associate Administrator, External Relations, HQS

Meritorious Awardees

George W. Abbey, Deputy Associate Administrator, Space Flight, NASA HQS

Frank Allario, Chief, Flight Electronics Division, LARC

C. Donald Bean, Director, Administrative Operations, MSFC

Gene P. Bridwell, Manager, External Tank Project Shuttle Projects Office, MSFC

Robert W. Brown, Director, Educational Affairs Division, Office of External Relations, NASA HQS

Nathaniel B. Cohen, Director, Strategic Planning and Analysis, Office of the Administrator, NASA HQS (Recently Retired)

Benita A. Cooper, Assistant Administrator, Headquarters Operations, NASA HQS

Jeremiah F. Creedon, Director, Flight Systems, LARC

Max Engert, Deputy Director, Engineering, JSC

Eugene Ferrick, Jr., Director, Tracking and Data Relay Satellite Systems Division, Office of Space Operations, NASA HQS

Charles S. Harlan, Director, Safety, Reliability, and Quality Assurance Office, JSC

Tommy W. Holloway, Chief, Flight Director Office Mission Operations Directorate, JSC

W. Ray Hook, Director for Space, LARC

Joseph A. Lombardo, Manager, Space Shuttle Main Engine Projects, Shuttle Projects Office, MSFC (Recently Retired)

Henry Lum, Jr. Chief, Information Sciences Division, ARC

Frank B. McDonald, Associate Director/Chief Scientist, GSFC

Billie J. McGarvey, Assistant Associate Administrator, Facilities Management, Office of Management, NASA HQS

Lawrence J. Ross, Deputy Director, LERC

James T. Rose, Assistant Administrator, Commercial Programs, NASA HQS

George T. Sasseen, Engineering Director, STS Management and Operations, KSC

Robert J. Schwinghamer, Director, Materials and Processes Laboratory, Science and Engineering Directorate, MSFC

Gerald W. Smith, Manager, Solid Rocket Booster Project, Shuttle Projects Office, MSFC

Susan M. Smith, Chief Counsel, MSFC

Kenneth J. Szalai, Chief, Research Engineering Division, ARC

Gary L. Tesch, Deputy General Counsel, NASA HQS

Ronald L. Thomas, Director of Space Station Freedom, LERC

Thomas E. Utsman, Deputy Director, KSC

Samuel L. Venneri, Director, Materials and Structures Division, Office of Aeronautics and Space Technology, NASA HQS

Walter C. Williams, Special Assistant to the Administrator, NASA HQS (Recently Retired)

HUMAN FACTORS

Fitts Appointed DAA for Office of Space Operations

NASA Administrator Richard H. Truly has announced the appointment of Jerry J. Fitts as the Deputy Associate Administrator for Space Operations.

Fitts succeeds Charles T. Force, who was appointed Associate Administrator for Space Operations in July 1989. The Office of Space Operations manages the agency's worldwide data and tracking network, which tracks and communicates with all manned and unmanned spacecraft and interplanetary probes.

Fitts joined NASA in 1962, serving in the Space Nuclear Propulsion Office, where he ultimately became responsible for engine systems design and development at the Lewis Research Center. He came to NASA from General Dynamics, where he participated in NASA's Centaur program.

Fitts left NASA to help establish the Office of Research and Technology at the Department of Housing and Urban Development. He was director of the Housing and Economic Research Division for six years.

In 1980 he returned to NASA as Deputy Director of Space Shuttle Main Engines Program within the Headquarters Office of Space Flight. Subsequently, Fitts served as director, solid rocket booster and external tank division and as deputy director, Customer Services Division.

In February 1987, Fitts became director of the Transportation Services Office, a focal point for the NASA, DOD, civil and international payload communities that require transportation services on the Space Shuttle or expendable launch vehicles. He was also responsible for space transportation policy development and manifesting of payloads on the various launch systems.

Person Honored by SAE

Lee H. Person Jr., research pilot at Langley Research Center, has been honored by the Society of Automotive Engineers (SAE). Person was selected a recipient of the 1989 SAE Oral Presentation Award for his presentation titled, "To Go...or...Not To Go: Another Look at Monitoring Takeoff Performance".

Person began his NASA career at Langley in 1962. His flight experience includes 8,500 hours in over 110 types of fixed-wing, rotary-wing and vertical short takeoff and landing (V/STOL) aircraft.

For the past 14 years, Person has been lead pilot for NASA's Advanced Transport Operating Systems program (ATOPS), spending most of his time in the research flight deck of a highly modified Boeing 737 aircraft.

Dryden's Iliff Honored

Dr. Kenneth W. Iliff, chief of the fluid and flight mechanics branch at Ames-Dryden Flight Research Facility, Edwards, Calif., has been inducted in the the National Hall of Fame for Persons with Disabilities in recent ceremonies.

Iliff is known internationally as an expert in aircraft parameter estimation — a field that determines the nature and structure of a system by using the response of that system. Iliff has worked on most of the advanced aircraft flown by NASA in the past 25 years, including the X-15, the XB-70 and the Space Shuttle.

Ames's Haslim Lauded for Aircraft Deicing Invention

Leonard A. Haslim, has been honored by *Research and Development* magazine for his invention of a deicing system for aircraft and ships.

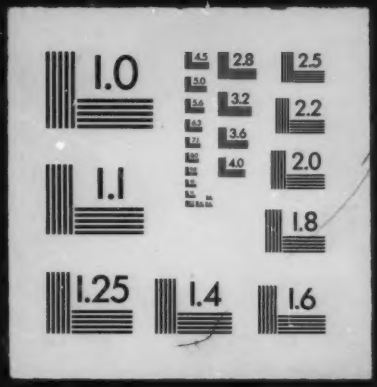
The annual award, the "Research and Development 100 Award" is a recognition of the top 100 inventions selected form a field of over 1,000 submitted by corporations and government research laboratories, both domestic and foreign.

Haslim's system has the advantage of being very effective, while consuming less power than any other system on the market today.

The system operates like two plastic coated magnets that push against each other when they receive an electrical charge. Using a larger version of a power supply typically used to operate a camera photo flash, the system's stored electrical energy produces a mechanical pulse that can reduce ice that has grown from frost to one-inch thick ice into powder.

The system, called the Electro-Expulsive Separation System (EEDS), is lightweight and fits easily onto almost any part of an aircraft or nautical vessel that accumulates unwanted ice. It is thin enough (1/50 inch) not to impede air flow.

The invention garnered Haslim the 1988 NASA Inventor of the Year award, as well. ■


1.0
1.1
1.25
1.4
1.6
2.8
3.2
3.6
4.0
2.5
2.2
2.0
1.8